CHAPTER 7
FINAL REGULATORY IMPACT REVIEW
AND FINAL REGULATORY FLEXIBILITY ANALYSIS

7.1 Background

An integral part of an FMP or FMP amendment is an analysis of the economic effects of the various management alternatives. This economic analysis is critical to identify the measures that minimize economic impacts while meeting overall management goals of the FMP or FMP amendment. The analyses presented in this chapter and throughout the FMP assess the economic impacts of the final actions in general and specifically on small businesses in order to meet requirements of Executive Order (E.O.)12866 and the Regulatory Flexibility Act (RFA). Presented in this chapter are the Final Regulatory Impact Review (RIR) and the Final Regulatory Flexibility Analysis (FRFA).

Prior to presenting these analyses, it is important to clarify the difference between two types of economic measures: net economic benefit and economic impact. While the Magnuson-Stevens Act makes reference to net national economic benefits and costs, the analyses required under NOAA's guidelines for the RFA include economic impact analyses, such as impacts on gross revenues and/or costs. Both are important measures of the effects of management, however, they are different. Misuse of these two measures often leads to inappropriate comparisons of the "values" of various fisheries and/or fishery user groups.

7.1.1 Net Economic Benefit

The net economic benefit is the difference between benefits and costs. In examining alternatives, these are often considered at the margin, i.e., the change in net benefits in moving from the status quo to another alternative. Net economic benefit is the only true measure of the "value" of a fishery. Note that net economic benefit measures the benefit to the owner of an entity. Thus, net economic benefit considers employment as a cost since the owner pays the wages. Thus, all other things being equal, the more employment generated under an alternative, the lower the net economic benefit.

Net economic benefit from the commercial fishery is primarily producer surplus, which is the difference between gross revenues and all fishing costs, including labor costs for the crew and captain and a return to the vessel owner. Net economic benefit from the commercial fishery also includes consumer surplus, which is the net value to the consumer of the seafood product, over and above its purchase price. Note that in the case of a seafood product which is exported, consumer surplus is omitted from the analyses herein, as it does not contribute to national net economic benefit.

Due to limited data on fishing costs, and limited studies measuring consumer surplus for seafood products, net economic benefits are difficult to measure in HMS commercial fisheries. Trip-level data on fishing costs are collected on a voluntary basis in an add-on questionnaire at the end of the pelagic longline trip summary form. Some cost data are also available from previous surveys of the various highly migratory species fleets. The most straightforward method of evaluating producer and consumer surplus is to sell individual transferable quotas: for example, the price bid by an individual fisherman for the exclusive

opportunity to harvest one bluefin tuna reflects either producer surplus (for a commercial

fisherman) or consumer surplus (for an angler or conservationist).

Net economic benefit in the recreational fishery is primarily angler consumer surplus (ACS), which is the willingness of anglers to pay for their recreational fishing opportunities over and above the actual costs they incur. ACS is measured through various techniques, all of which require survey data and considerable analyses. Travel cost models and contingent valuation techniques are the most common; both have been used for the valuation of the recreational fishery for bluefin tuna. Net economic benefit from the recreational fishery also includes producer surplus generated by charter/headboats, along with the ACS of their clientele. Charter vessel producer surplus is estimated as the difference between charter fee revenues and the costs of operating the vessel. Knowledge of ACS for HMS fisheries is severely limited.

HMS and other marine species provide additional values beyond those resulting from fishing activities. Conservationists who value the survival of a particular fish species without regard to fishing or other interaction with that species also benefit from the fishery; this kind of consumer surplus is referred to as "existence value." "Non-consumptive use values" are a second type of non-fishing benefit provided by marine animals; as the term implies, this class of benefits refers to benefits derived from using animals in a way that does not "consume" them. Non-consumptive uses can be important in a commercial sense, to the extent that they can generate net economic benefits such as whale watching, snorkeling, etc. Like ACS, the net economic benefits associated with non-consumptive uses is the value placed on them over and above the actual costs incurred in pursuing them. Estimates of existence value are particularly important for protected species, such as marine mammals. Contingent valuation techniques have been used by economists to assess the value to society of such non-market goods and services, and the techniques have been endorsed by a NOAA Blue Ribbon Panel of independent experts. However, the use of contingent valuation techniques to answer public policy questions is still considered controversial.

In one contingent valuation study, Strand, McConnell and Bockstael (1994) conducted a survey of Massachusetts households in order to estimate what individuals would pay to protect harbor porpoises. Their results showed a mean willingness-to-pay per household of between $176 and $364 to eliminate human-induced mortality of 1,000 porpoises. Even if the lower figure is used as a conservative estimate, the study indicates a significant value when aggregated across all households in Massachusetts. The total value to society as a whole would be even larger, as the existence value of the porpoises is not limited to states or areas in the proximity of the fishery.

NMFS does not have value estimates for animals protected by the ESA or MMPA taken in HMS fisheries, but the above-cited study indicates that people do value the existence of marine mammals. For that reason, it is important to consider the value to society of protecting endangered and threatened species. Due to lack of specific valuation data, no attempt has been made to include such values in the analyses presented below. Rather, they are mentioned to illustrate the high value the public places on eliminating human-induced mortality of marine mammal stocks. Note that if a market situation could be developed, (e.g., transferable quotas), societal values for marine mammal protection could be expressed

through trade such as a buyout of swordfish permits, which are subsequently taken out of the fishery.

7.1.2 Economic Impact

Economic impact is the effect on expenditures of the various user group activities. In the commercial fishery, economic impact includes expenditures (bait, tackle, labor, etc.) and/or ex-vessel value of commercial landings plus value-added. In the recreational fishery, economic impact is also the money spent by anglers, including charter boat fees, bait, fuel and tackle, travel (lodging, gas, hotels, restaurants, etc.). Non-consumptive uses such as whale watching can have similar economic impacts, such as expenditures on boat fees and travel (lodging, gas, hotels, restaurants, etc.)

The relative levels of economic impact allow cross-comparison of the effect of the measures on the level of expenditures -- primarily fishing costs -- from both the recreational and commercial fisheries. Expenditures may be examined in the format of an input-output model, which traces the "ripple" effect of every dollar of expenditures in one sector on other sectors, often referred to as secondary, or induced, effects. Expenditures can also be used to estimate the number of jobs generated by various management measures. Economic impacts can be important to communities, as employment levels, income and a wider tax base are desirable economic effects of fishing activities.

7.1.3 Common Misconceptions

The most common error made with reference to economic information about a fishery is the comparison of recreational angler expenditures to ex-vessel sales of commercial fish to determine the relative "values" of each. A more appropriate approach would be a comparison of expenditures in each sector, along with "value-added" estimates. In any case, neither statistic is an indicator of the net economic benefit of the fishery, which is the true "value"; i.e., benefits over and above costs. The paradox of net economic benefit and economic impact measures is that they do not always point in the same direction. For example, higher costs increase economic impact but decrease economic benefit, all other things being equal. Thus, a measure that increases fishing expenditures can increase the economic impact while reducing net economic benefit. Similarly, a measure that increases employment actually can decrease net economic benefit -- since a job is a cost to the owner -- while increasing economic impact. While employment levels, personal income, and tax revenues from fishing expenditures are important on a regional and local basis, they are not equivalent to national net economic benefit. It is important to keep these distinctions in mind when examining the economic analyses that follow.

7.1.4 Present Value Analyses

The rebuilding programs in this FMP include a number of alternatives for rebuilding overfished HMS fisheries. To facilitate comprehension of the relative economic effects of the various alternatives, a present value is calculated for both gross and net revenues for each of the alternatives. The present value is the value from today's perspective of the future stream of revenues (gross or net) from each alternative. Revenues in the future must be discounted, since a dollar received today is worth more than a dollar received several years down the road (i.e., one could invest that dollar today and earn interest). Each year into the future, the discount applied to the expected revenues is increased. The net present value represents today's value of the expected future stream of net revenues, summed over all the years in the analysis. A critical element of present value analysis (PVA) is the discount rate. A seven percent real discount rate is used in the analyses below, per Office of Management and Budget Circular Number A-94.

An important caveat about PVAs should be noted. The analyses presented below are static; all of the important parameters in the analysis -- catch, price, and cost -- are held constant for the periods being analyzed. In addition, species composition of catch, and therefore costs and revenues, is assumed constant. This assumption may be unrealistic, but NMFS does not have sufficient information to make quantitative estimates of changes to these parameters over time. For example, as fish stocks decline, the costs per unit of effort and/or output associated with catching the fish increase, and will eventually exceed any revenues derived. At that point, the fish stock is considered commercially extinct. A commercially extinct fish stock provides neither gross nor net revenues. This is important to remember because some of projections, particularly for large coastal sharks, show decreasing stocks, but fishing costs are held constant in the economic analyses. Similarly, as fish stocks decline and supply falls, market prices may increase, offsetting to some extent the increase in costs. On the other hand, as a fish stock rebuilds, the catch rate or catch per unit effort are expected to increase. When this happens, the cost of catching each fish decreases while the potential net revenues from fishing increases. Thus a fish stock that is recovered or is in the process of rebuilding should bring in additional revenue even if the quota is not increased. Future work on bioeconomic models and additional information on the economic state of HMS fisheries may allow dynamic analyses of economic projections.

Currently, NMFS does not have the quantitative information needed to estimate potential changes in ex-vessel price from supply changes. However, for some products, such as bluefin tuna and shark fins, U.S. producers are generally considered to be "price takers", because these products are traded on a world market in which the United States provides a relatively small share. Similarly, U.S. producers of swordfish are price takers since their supply is around one-fourth of the U.S. consumption, and much less of the world production. Therefore, even when a seafood product is not exported, international supply and demand exert an important force on prices. Despite being a price taker, sudden shifts in U.S. supply (e.g., during a directed fishery closure) can result in sufficiently great, if localized, market gluts to yield price effects. One domestic product for which the U.S. supply and demand may directly influence the ex-vessel price is shark meat. However, given the current short seasons and small supply, NMFS is unable to predict the extent to which rebuilding may

affect the ex-vessel price of this product. As such, all estimates of present value should be considered approximations with a high degree of uncertainty. The results should be used only for purposes of a relative comparison of the present value of the gross and net revenues of the various alternatives.

7.1.5 RIR versus RFA

The focus of the RIR is on the net economic benefit from the entire fishery to the nation, although economic impacts are also considered. Because net economic benefits are not always available, and/or because they are approximated, PVAs of gross revenues are conducted for all cases. In the RFA, the focus is on small businesses (i.e., the economic impact on the individual fishermen) and the effect of regulatory measures on their revenues and/or costs. While the NOAA guidelines for the RFA analyses focus primarily on impacts on either revenues and/or costs (depending upon the measure being considered as well as available data), the financial condition of affected firms (i.e., the net effect of revenue and cost changes) is also an important cornerstone to RFA analyses. The RFA analyses performed used a combination of mandatory logbook (census-level data) and observer data (sample-level data), as well as any available information from special studies or surveys on the financial condition of fishing firms.

The requirements under E.O. 12866 and RFA are similar. Both require a description of the need for the action, the management objectives, and a description of the expected economic impacts. The RIR and RFA also require an analysis of each alternative and the expected effects. A final regulatory flexible analysis requires a summary of the issues raised during the public comment period, a description of the entities to which the rule will apply, a description of the compliance or paperwork requirements, and a description of the steps taken to minimize the economic impacts.

7.2 The Need for Action

As described in Chapter 1, the U.S. Congress reauthorized the Magnuson-Stevens Act in 1996. This reauthorization included an emphasis on the precautionary approach in the U.S. fishery management policy. New provisions included requirements to halt overfishing, rebuild overfished fisheries, and to minimize bycatch and bycatch mortality, to the extent practicable. Ten national standards and guidelines to the standards describe the goals and objectives of this precautionary approach. The ten National Standards are listed in Chapter 1.

In September 1997 and again in October 1998, NMFS produced a report to Congress with a list of overfished fisheries which included several HMS. In addition, NMFS established an HMS advisory panel (AP) which has assisted and advised NMFS in the formation of the alternatives considered in the draft FMP and addendum, and commented on the draft FMP. This final FMP includes rebuilding programs for HMS that have been designated as overfished. The rebuilding programs include status determination criteria which allow managers to determine whether overfishing is occurring or a stock is overfished. This FMP also considers alternatives for stocks that are fully fished in order to prevent overfishing from occurring. Chapter 1 fully describes the problems in HMS fisheries. These problems are summarized below:

- Overfished populations of HMS;
- Excess fishing mortality caused by bycatch and discards;
- Inconsistencies in international compliance with conservation and management measures;
- Assuring optimal data collection;
- Integration of domestic HMS management needs; and,
- Overcapitalization.

7.3 Objectives of the FMP

Chapter 1 describes the objectives of this FMP and the Magnuson-Stevens Act. The over-riding goal throughout this document is to prevent overfishing and to rebuild overfished Atlantic HMS stocks as defined in the Magnuson-Stevens Act and the National Standards. These objectives are also listed below:

- To prevent or end overfishing of Atlantic tuna, swordfish, and sharks and adopt the precautionary approach to fishery management;
- To rebuild overfished fisheries in as short a time as possible and control all components of fishing mortality, both directed and incidental, so as to ensure the long-term sustainability of the stocks and promote stock recovery of the management unit to the level at which the maximum sustainable yield can be supported on a continuing basis;
- To minimize, to the extent practicable, economic displacement and other adverse impacts on fishing communities during the transition from overfished fisheries to healthy ones;
- To minimize, to the extent practicable, bycatch of living marine resources and the mortality of such bycatch that cannot be avoided in the fisheries for Atlantic tuna, swordfish, and sharks;
- To establish a foundation for international negotiation on conservation and management measures to rebuild overfished fisheries and to promote achievement of optimum yield for these species throughout their range, both within and beyond the exclusive economic zone. Optimum yield is the maximum sustainable yield from the fishery, reduced by any relevant social, economic, or ecological factors;
- To provide a framework, consistent with other applicable law, to take necessary action under ICCAT compliance recommendations;
- To provide the data necessary for assessing the fish stocks and managing the fisheries, including addressing inadequacies in current collection and ongoing collection of social, economic, and bycatch data about HMS fisheries;

- Consistent with other objectives of this FMP, to manage Atlantic HMS fisheries for continuing optimum yield so as to provide the greatest overall benefit to the Nation, particularly with respect to food production, providing recreational opportunities, preserving traditional fisheries, and taking into account the protection of marine ecosystems;
- To better coordinate domestic conservation and management of the fisheries for Atlantic tuna, swordfish, sharks, and billfish, considering the multispecies nature of many HMS fisheries, overlapping regional and individual participation, international management concerns, historical fishing patterns and participation, and other relevant factors;
- To simplify and streamline HMS management while actively seeking input from affected constituencies, the general public, and the HMS AP;
- To promote protection of areas identified as essential fish habitat for tuna, swordfish, and sharks;
- To reduce latent effort and overcapitalization in HMS commercial fisheries;
- To develop eligibility criteria for participation in the commercial shark and swordfish fisheries based on historical participation, including access for traditional swordfish handgear fishermen to participate fully as the stock recovers; and
- To create a management system to make fleet capacity commensurate with resource status so as to achieve the dual goals of economic efficiency and biological conservation.

7.4 Description of the Compliance and Reporting Requirements

The final actions described throughout this FMP do not significantly change the compliance and reporting regulations for commercial or recreational fishermen. Commercial and recreational fishermen will still need to abide by federal quotas, commercial retention limits, recreational retention limits, minimum sizes, and fill out logbooks. In addition, this FMP establishes a new minimum size for large coastal sharks, mandatory vessel monitoring system (VMS) for pelagic longline fishermen, gear marking, a mid-Atlantic time/area closure for pelagic longline fishermen, limited access for commercial fishermen, and filling out the logbook within 48 hours of the set. There are new requirements for charter/headboat fishermen including permit requirements and reporting in a logbook. Also, under this FMP, tournament operators are required to notify NMFS of any tournament involving awards or points for HMS. NMFS believes that the majority of fishermen involved in HMS fisheries will have little difficulty complying with the changes in reporting as most of the requirements will not add to the cost of fishing or change the revenue from fishing. However, a few of the reporting alternatives will increase the fixed and/or variable costs (i.e., VMS, time/area closure). These alternatives are discussed in Section 7.7 and in Chapter 3.

7.5 Relevant Federal Rules which May Conflict with the Final Actions

As described in Chapter 1, HMS fishermen and managers must comply with a number of international agreements, domestic laws, and other FMPs. These include, but are not limited to the Magnuson-Stevens Act, the Atlantic Tunas Convention Act, the High Seas Fishing Compliance Act, the Marine Mammal Protection Act, the Endangered Species Act, the National Environmental Policy Act, RFA, the Paperwork Reduction Act, the Coastal Zone Management Act, and the United Nations Agreement on Straddling Fish Stocks. The final actions in this FMP comply with all relevant regulations while still preventing overfishing and rebuilding the stock. When the final actions impact fishermen who fish in other U.S. fisheries, NMFS has worked with the relevant Fishery Management Councils and the states to ensure consistency among the regulations (e.g., upgrading restrictions for limited access). Thus, NMFS does not believe that any of the final actions conflict with relevant regulations, federal or otherwise.

7.6 Final Regulatory Impact Review

Executive Order 12866, signed in October 1993, requires agencies to take a deliberative, analytical approach to rulemaking, including assessment of the costs and benefits of proposed and final actions. The Department of Commerce (DOC) and NOAA require preparation of an RIR for all regulatory actions that either implement a new fishery management plan, significantly amend an existing plan, or may be significant in that they reflect important DOC/NOAA policy concerns and are of public interest. The RIR provides a comprehensive review of the changes in net economic benefits to society expected from the implementation of the final actions. The analysis also provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve problems. The purpose of the analysis is to ensure that the regulatory agency systematically and compre-hensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost-effective way.

The following sections contain the bulk of the RIR. However, many other parts of this FMP, especially Chapter 3, also contain relevant sections.

7.6.1 Economic Impacts of the Bluefin Tuna Rebuilding Alternatives

The economic impacts of the alternatives considered for bluefin tuna management are discussed below and in Chapter 3. The two major types of management options considered are: 1) target recovery periods and the quotas associated with them; and 2) alternatives for allocating quota among the recreational and commercial user groups. Each of the three rebuilding alternatives can be combined with any of the four allocation alternatives. This yields 12 possible combinations of rebuilding and allocation alternatives. These are analyzed in terms of present value of commercial revenues and present value of recreational net economic benefit. Two types of economic analyses were conducted for each combination:

- *Total gross Bluefin tuna revenues* were calculated based on the proposed quotas and recovery periods (for commercial categories only), and
- *Total net Bluefin tuna revenues* were calculated by subtracting estimates of variable costs from the gross revenue estimates (for commercial categories only; the present value of ACS was estimated for the Angling category).

7.6.1.1 Estimated Commercial Gross Revenues

Each of the three rebuilding alternatives considered sets a different time frames for rebuilding to the biomass associated with maximum sustainable yield (B_{MSY}). All rebuilding alternatives, except one, has a 20-year rebuilding time period. The other alternative has a ten-year rebuilding time period. After rebuilding is achieved, the quotas are assumed to be the same under all alternatives. To enable comparison of the alternatives on the basis of total gross revenues, a PVA of gross revenues from bluefin tuna landings was performed for each rebuilding/allocation combination. Quotas are presented in whole weights and prices and/or U.S. quotas have been adjusted accordingly, as necessary.

The time frame for the PVA was set to 38 years (1999 to 2036). This is the same time frame that was used in the draft HMS FMP released in October and the Addendum. Thus, comparisons between all documents are possible. Commercial prices used are 1997 averages specific to quota category, and were obtained from the dealer report database housed in NMFS Northeast Regional Office. For each year of each scenario, this price was multiplied by the appropriate quota (rebuilding, transition, or post-rebuilding) as well as the percentage allocated to that permit category to obtain total estimated gross revenues for each of the four commercial categories.

The resulting gross revenue streams were then discounted at seven percent to obtain the estimated present value of total gross bluefin tuna revenues under each alternative. The present value of gross revenues under the 12 rebuilding/allocation combinations ranges from $193 million to $288 million. Table 7.1 summarizes the results of the gross revenues analysis. For status quo catch levels, the present value of gross and net revenues for the status quo and status quo with purse seine cap allocation alternatives are the same. This is because at status quo catch levels, the purse seine allocation would not be above 250 mt with the status quo allocation alternative. Thus, the 250 mt cap would not have any limiting effect at status quo catch levels. As stated above, the PVA estimates should be considered an approximate value with a wide band of uncertainty.

7.6.1.2 Estimated Commercial Net Revenues

An analysis of net revenues was performed by subtracting estimated variable costs from estimated gross revenues. The analysis was performed on a per-ton basis. Gross revenues per ton were estimated using 1997 commercial price averages specific to quota category; these were obtained from the dealer report database housed in NMFS Northeast Regional Office. Cost estimates were also specific to quota category; the source of cost data varied by commercial category, as described below. This analysis

assumes that the dead discards are equal, on average, to the dead discard allowance and that the reserve is not used.

General Category

Estimates of trips per fish and costs per trip for the General category were obtained from responses to a survey distributed by the General Category Tuna Association (GCTA) in 1998. Combining these data with an average weight per fish created a variable cost per mt estimate of $11,146. Based on this estimate, and an estimate of gross revenues per mt of $15,785, the average net revenues for the General category are estimated to be $4,639 per mt.

Harpoon Category

The estimated variable costs for the Harpoon category were $6,273 per mt (Watson, 1996) as compared with gross revenues per mt of $17,769. These estimates result in net revenues per mt of $11,497.

Purse Seine Category

Variable cost estimates of $10,581 per mt (NMFS, 1995) were used. Subtracting this amount from the gross revenues per mt of $18,365 results in net revenues per metric ton of $7,784.

Incidental Category

Variable costs for the Incidental category are assumed to be zero, since truly incidental catch incurs no additional costs. As a result, the net revenues per mt are equal to the gross revenues per mt of $11,596.

Table 7.1 contains the results of the net revenue analysis. The estimated present value of bluefin tuna commercial net revenues ranges from a low of $75 million to a high of $116 million. In general, faster rebuilding schedules result in a lower present value of net revenues because they reduce net revenues in the near future. This outcome stems from the fact that near-future net revenues are less heavily discounted in PVA than revenues of more distant years. However, a faster rebuilding time period should recover the stock faster, and thus, catch per unit of effort should increase in a shorter time period. This may translate into lower costs and may have a positive impact on future net revenues.

Table 7.1 Present value of commercial bluefin tuna gross and net revenues under the rebuilding and allocation alternatives.

Status Quo Landings Level			
Allocation Alternative	**Category (Allocation %)**	**PV of Gross Revenues**	**PV of Net Revenues**
Status Quo	General (47.1%)	$133,078,438	$39,113,925
	Purse Seine (18.6%)	$61,140,883	$25,913,599
	Harpoon (3.9%)	$12,404,333	$8,025,504
	Incidental (8.2%)	$17,020,541	$17,020,541
	All Commercial	**$223,644,195**	**$90,073,570**
SQ w/ Purse Seine Cap	General (47.1%)	$133,078,438	$39,113,925
	Purse Seine (18.6%)	$61,140,883	$25,913,599
	Harpoon (3.9%)	$12,404,333	$8,025,504
	Incidental (8.2%)	$17,020,541	$17,020,541
	All Commercial	**$223,644,195**	**$90,073,570**
Zero Angling Allocation	General (59.0%)	$166,701,228	$48,996,212
	Purse Seine (23.3%)	$76,590,461	$32,461,659
	Harpoon (5.0%)	$15,902,991	$10,289,108
	Incidental (10.2%)	$21,171,892	$21,171,892
	All Commercial	**$280,366,572**	**$112,918,872**
50% Purse Seine Reduction	General (53.6%)	$151,443,827	$44,511,813
	Purse Seine (9.3%)	$30,570,442	$12,956,800
	Harpoon (3.9%)	$12,404,333	$8,025,504
	Incidental (8.2%)	$17,020,541	$17,020,541
	All Commercial	**$211,439,143**	**$82,514,658**
10 Year Rebuilding Period			
Allocation Alternative	**Category (Allocation %)**	**PV of Gross Revenues**	**PV of Net Revenues**
Status Quo	General (47.1%)	$121,236,616	$35,633,420
	Purse Seine (18.6%)	$55,700,337	$23,607,709
	Harpoon (3.9%)	$11,300,549	$7,311,365
	Incidental (8.2%)	$15,505,989	$15,505,989
	All Commercial	**$203,743,490**	**$82,058,483**
SQ w/ Purse Seine Cap	General (47.1%)	$121,236,616	$35,633,420
	Purse Seine (18.6%)	$55,700,337	$23,607,709
	Harpoon (3.9%)	$11,300,549	$7,311,365
	Incidental (8.2%)	$15,505,989	$15,505,989
	All Commercial	**$203,743,490**	**$82,058,483**
Zero Angling Allocation	General (59.0%)	$151,867,523	$44,636,344
	Purse Seine (23.3%)	$69,775,153	$29,573,098
	Harpoon (5.0%)	$14,487,883	$9,373,544
	Incidental (10.2%)	$19,287,938	$19,287,938
	All Commercial	**$255,418,496**	**$102,870,924**

50% Purse Seine Reduction	General (53.6%)	$137,967,784	$40,550,984
	Purse Seine (9.3%)	$27,850,168	$11,803,855
	Harpoon (3.9%)	$11,300,549	$7,311,365
	Incidental (8.2%)	$15,505,989	$15,505,989
	All Commercial	**$192,624,489**	**$75,172,192**
1998 ICCAT 20 Year Rebuilding Period			
Allocation Alternative	**Category (Allocation %)**	**PV of Gross Revenues**	**PV of Net Revenues**
Status Quo	General (47.1%)	$136,542,508	$40,132,072
	Purse Seine (18.6%)	$62,732,398	$26,588,138
	Harpoon (3.9%)	$12,727,221	$8,234,411
	Incidental (8.2%)	$17,463,591	$17,463,591
	All Commercial	**$229,465,718**	**$92,418,211**
SQ w/ Purse Seine Cap	General (47.1%)	$136,542,508	$40,132,072
	Purse Seine (18.6%)	$60,572,907	$25,672,871
	Harpoon (3.9%)	$12,727,221	$8,234,411
	Incidental (8.2%)	$17,463,591	$17,463,591
	All Commercial	**$227,306,227**	**$91,502,945**
Zero Angling Allocation	General (59.0%)	$171,040,509	$50,271,598
	Purse Seine (23.3%)	$78,584,133	$33,306,646
	Harpoon (5.0%)	$16,316,950	$10,556,937
	Incidental (10.2%)	$21,723,003	$21,723,003
	All Commercial	**$287,664,596**	**$115,858,183**
50% Purse Seine Reduction	General (53.6%)	$155,385,954	$45,670,468
	Purse Seine (9.3%)	$31,366,199	$13,294,069
	Harpoon (3.9%)	$12,727,221	$8,234,411
	Incidental (8.2%)	$17,463,591	$17,463,591
	All Commercial	**$216,942,965**	**$84,662,538**

7.6.1.3 Estimated Angler Consumer Surplus

Net economic benefit in the recreational fishery is primarily angler consumer surplus, which is the willingness to pay over and above the costs of recreational fishing. An estimate of ACS per mt was obtained by combining data on ACS per trip (Lent and Vasavada, 1993) with catch and effort data (NMFS, 1997). Multiplying this estimate by the angler quota for each rebuilding and allocation alternative yielded the present values presented in Table 7.2 below. As described in Chapter 2, a recent study of the winter recreational bluefin tuna fishery in North Carolina estimated angler willingness to pay to be $344 to $388 per person in 1997 (Ditton *et al*. 1998). This estimate was not used in this analysis because the North Carolina bluefin tuna fishery is unique, as anglers travel great distances to participate in a primarily catch and release fishery for large bluefin tuna.

Table 7.2 Net present value (NPV) of angler consumer surplus (ACS) under the rebuilding and allocation alternatives.

Status Quo Landings Level	
Allocation Alternative	**Present Value of Net Revenues**
Status Quo	$228,441,158
SQ w/ Purse Seine Cap	$228,441,158
Zero Angling Allocation	$0
50% Purse Seine Reduction	$260,909,953
10 Year Rebuilding Period	
Status Quo	$208,167,221
SQ w/ Purse Seine Cap	$208,167,221
Zero Angling Allocation	$0
50% Purse Seine Reduction	$237,754,440
1998 ICCAT 20 Rebuilding Period	
Status Quo	$234,052,001
SQ w/ Purse Seine Cap	$234,052,001
Zero Angling Allocation	$0
50% Purse Seine Reduction	$267,318,275

7.6.2 Economic Impacts of the Alternatives to Minimize Bluefin Tuna Dead Discards

The alternatives considered for minimizing bluefin tuna dead discards are not expected to adversely impact the entire bluefin tuna fishery because they would not be reducing the quota levels. As such, the present value analysis used above was not conducted. Instead, NMFS examined the economic impacts of each alternative designed to reduce dead discards for the bluefin tuna fishery.

Time/Area Closure

Table 7.3 summarizes the economic comparison of the best-case displacement scenario of the mid-Atlantic time/area closure within the study area. Table 7.3 also provides a range of possible economic impacts to the swordfish, BAYS tuna, and pelagic shark target fisheries. The estimates are derived by using 1997 landings, and 1997 average weights and prices.

Under the displacement model, the longline fishery concentrated in the study area is expected to lose less than one percent in annual gross revenues (Table 7.3). This model assumes that fishermen who normally fish in that area, move their effort elsewhere. However, if fishermen who normally fish in the proposed time/area closure decide not to fish, their gross revenues will be lost. In this case, the annual gross revenues in the fishery may decrease. NMFS believes it is unlikely that fishermen would stop fishing during the month of June.

Under the displacement model, the analysis predicts that the number of swordfish landed would increase. Although it is possible that the numbers of swordfish caught could increase by fishing elsewhere (i.e., areas 8 and 9), it is unlikely that fishermen would not already be conducting these operations. In addition, it is also unrealistic to see an increase in the overall number of swordfish landed because landings are quota-limited, i.e., with displacement the same quota limited tonnage of swordfish would still be landed, albeit in different areas and times.

In addition, it is unlikely that the quota for any species would not be caught because of a month-long closure in an area which is relatively small compared to the entire Atlantic coast and the Gulf of Mexico. Thus, even though a few individual fishermen or processors may feel the impact of the time/area closure, for the fishery as a whole, it is unlikely this time/area closure would have any economic impact (positive or negative) on the fishery in the short term.

However, these time/area closures are intended to benefit bluefin tuna stocks and assist with long-term rebuilding by reducing the waste associated with discards of dead bluefin tuna. This would translate in the long-term to increasing stock size of bluefin tuna, benefitting the directed fishery with associated increase in economic benefits which would partially offset negative impacts to the longline swordfish and other tuna fisheries. Thus, in the long-term, NMFS believes the mid-Atlantic time/area closure would have a positive economic impact. Indeed if dead discards is less than 68 mt ww, the directed fishery will receive half of the "savings."

Specific economic impacts of time/areas closures on individuals and communities would vary with: 1) their dependance on longline target fisheries for swordfish and other tuna in the study area; 2) their ability to increase the value of reduced catch; 3) their ability to shift effort to other areas and times; and, finally, 4) their ability to access other fisheries to maintain a steady revenue. It is likely that the economic impacts would be distributed primarily over the ports of New England and mid-Atlantic since they are in closest proximity to the closed area.

Table 7.3 A comparison of the economic impacts on the bluefin tuna fishery in the study area under the displacement model.

Species	Number Landed Annually in Study Area (Areas 0 - 9)	Number Predicted to Be Landed with Time/Area Closure	Average Weight (Lbs Dw)	Average Price ($/lbs Dw)	Gross Revenue Before Closure	Gross Revenue after Closure	Gross Revenue Lost or Gained*
Swordfish	13,952	14,066	67	$3.94	$3,683,049	$3,713,143	$30,094
BFT	72	59	359	$6.67	$172,406	$141,277	($31,129)
BAYS	40,625	40,567	69	$2.44	$6,839,625	$6,829,860	($9,765)
Pelagic Sharks	2,532	2,570	98	$0.95	$235,729	$239,267	$3,538
Total					**$10,930,809**	**$10,923,547**	**($7,262)**

* (Number) indicates negative, or decrease, in value.

Status Quo

Approximately 264 U.S. longline vessels fished throughout the Atlantic for HMS in 1996. The areas constitute the study area for this rule. In 1996, 62 vessels (23 percent of the active longline fleet), and 86 vessels (33 percent of the active longline fleet) fished in the Northeast Coastal and Mid-Atlantic Bight areas, respectively (Cramer and Adams, 1998).

Throughout the study area (see Appendix 6 for a description of this area and the analyses) there are certain areas and times when fishing effort on target species is greater than average. This is to be expected given the migration patterns of the target species and the bathymetry and oceanography of the area. Within areas zero through seven, approximately 1,641 swordfish and 12,919 tuna, other than bluefin tuna, were estimated caught in 1996. This is approximately two percent (1,641/94,636) of the total swordfish landings and approximately 15 percent (12,919/84,866) of the total BAYS tuna landings reported in 1996 (Cramer and Adams, 1998). According to Larkin *et al*. (1998), the majority of Atlantic-wide trips (30 percent), occurred from January through March, and the fewest number (14 percent) from October through December. Landings of BAYS tuna and swordfish were highest in the summer. The average number of sets per trip and trip length differed by less than one across seasons, and gear characteristics were also relatively constant across seasons.

Of the Atlantic pelagic longline vessels fishing in 1996, the majority were between 40 and 49 feet in length (Larkin *et al*., 1998). The study notes a high degree of hetero-geneity by vessel length and the number of sets per trip based on observed costs and landings. As the study area extends almost 500 nautical miles offshore, it can be assumed that the larger size vessels are used to fish in the distant, offshore portions within the study area. These larger vessels had the highest average landings of BAYS tuna.

Change Catch Limits

Changing the catch limits for the incidental longline category should not impact the directed target fishery economics as the bycatch of bluefin tuna is solely an incidental fishery. If, however, the catch limits were changed to make it easier to retain incidentally caught bluefin tuna, then additional revenue could be earned by longline fishermen from these additional sales. This, in turn, may provide an incentive for a targeted bluefin tuna fishery to develop, which would impact the other directed fishing categories. On the other hand, if catch limits were made more restrictive, then in the absence of additional actions to reduce the likelihood of catch, some revenue would be lost from bluefin tuna that could have been retained and sold. This could exacerbate the problem of bluefin tuna discards in this fishery and be counter to the intent of reducing bycatch.

Canadian Time/Area Closure Regime

In the Canadian swordfish fishery there are 77 swordfish longline licenses in Atlantic Canada. The Canadian fishery usually starts in early June and extends through October. The Atlantic swordfish longline quota was 647 metric tons in 1996 at an ex-vessel gross value of $5.6 million ($CD8.3 million). Ninety percent of swordfish landed in Canada are exported to the U.S. market. If the United States were to implement the Canadian system for handling

bluefin tuna discards in the swordfish fishery, it would have similar social and economic consequences as the preferred alternative except it is more likely to be longer, less predictable, and apply to a greater area. This could reduce revenues even more than the time/area closure implemented in this FMP.

Closure of All Longline Fisheries Once any Quota is Reached

Closing all fisheries once any quota has been reached would have a negative impact on fishermen who would not be allowed to participate in other fisheries. Although the possibility exists that a few individuals may benefit by being allowed to retain more bluefin tuna, most fishermen would be negatively impacted by being denied fishing opportunities for target species. Any quota remaining in these other fisheries would equate to lost revenue from foregone fishing opportunities. This alternative could likely have the greatest negative economic impact on those fishermen who do not catch bluefin tuna and would be excluded from other fisheries. Processors and consumers could also be negatively impacted by this alternative.

7.6.3 Economic Impacts of the Swordfish Rebuilding Alternatives

The economic impacts of the swordfish rebuilding alternatives considered are discussed below. The primary differences between the three alternatives are the target recovery periods and the quotas associated with them. As with the bluefin tuna analyses, two types of economic analyses were conducted for each alternative:

- *Total swordfish gross revenues* for the U.S. north Atlantic swordfish fishery were calculated based on the alternative quotas and recovery periods, and
- *Total swordfish net revenues* for the U.S. north Atlantic swordfish fishery were calculated by subtracting estimates of variable costs from the gross revenue estimates.

Table 7.4 summarizes the results of these two analyses. Note, the status quo was not analyzed quantitatively. A qualitative discussion of this alternative can be found in Chapter 3.

7.6.3.1 Estimated Gross Revenues

Each of the three quota alternatives sets a different time frame for rebuilding to B_{MSY}. The alternative quotas reflect these differing rebuilding periods; faster rebuilding schedules require smaller quotas during the rebuilding period, while slower rebuilding schedules allow larger quotas during the rebuilding period. After rebuilding is achieved, quotas are assumed to be the same under all three alternatives. Thus, the alternatives result in different levels of swordfish landings -- and thus revenues -- over the coming years. To enable comparison of the alternatives on the basis of total gross revenues, a PVA of gross revenues from swordfish landings was performed for each alternative.

The time frame for the PVA was set to ten years, which is equal to the time frame of

the longest rebuilding period. The swordfish price was assumed to be constant over the period at $3.94 per pound dw (Larkin *et al*., 1998). In the draft FMP, NMFS used a value of $2.96 per pound dw, however, in their comments, Larkin and Lee pointed out that the value used in their document was actually in whole weight. For the purposes of determining eligibility for limited access, NMFS decided that given the impact of quality and size of the fish on the price, $2.96 per pound dw was a reasonable proxy, especially given the change since the draft FMP which allows fishermen to indicate they landed $5,000 in gross revenues a year from swordfish fishing. For these analyses, however, NMFS decided to use $3.94 per pound dw. It should be noted that while the swordfish price used does impact the absolute value of the fishery, it does not affect the relative PVA values of the rebuilding alternatives.

For each year, the price per pound was multiplied by the appropriate quota (rebuilding or post rebuilding) to obtain total estimated gross revenues. Note that two adjustments were made to the quotas prior to this calculation. First, the quota was converted from whole weight to dressed weight by dividing the whole weight quotas by a conversion factor of 1.33. The remaining dressed weight quota was then reduced by 13 percent to reflect the expected impact of counting dead discards against the U.S. quota. Rebuilding and post-rebuilding quotas were determined as follows:

- *Rebuilding Years*: Each alternative is associated with a unique, constant quota during the rebuilding period. A six-year rebuilding schedule, for example, requires an Atlantic-wide quota of 8,000 mt ww; based on the U.S. percentage of this quota (29 percent), the U.S. quota is thus 1,740 mt ww for the six rebuilding years.
- *Post-Rebuilding Years*: For post-rebuilding years, it was assumed that the U.S. quota would be 3,700 mt ww under all alternatives; this figure represents 29 percent of the ICCAT estimate of maximum sustainable yield for the north Atlantic stock (13,000 mt ww).

The resulting revenue streams were then discounted at seven percent to obtain the estimated present value of total gross north Atlantic swordfish revenues under each alternative. The range of net present value for gross revenues under the three alternatives is small ($94 to 97 million). The estimates of present value presented here should be considered approximates with a large band of uncertainty, and are useful primarily for comparative purposes.

7.6.3.2 Estimated Net Revenues

Net revenues were estimated by subtracting estimates of variable costs from the gross revenue estimates. Cost data were obtained from a description of the voluntary 1996 trip summary report data from pelagic longline vessels (Larkin, *et al*., 1998). The data requested on the trip summary forms include cost data for fuel, bait, ice, groceries, light sticks, and miscellaneous expenses (including docking and unloading fees). In addition, the form requests the amounts paid to the crew, captain and vessel owner per trip. Responses were received from 95 pelagic longline vessels. Table 7.5 summarizes the average costs per trip as reported by these 95 vessels for a total of 488 trips in 1996.

The cost data in Table 7.5 are on a per-trip basis. However, pelagic longline vessels catch a variety of species, so the entire variable cost for a given trip should not be subtracted from swordfish revenues. Rather, some portion of those costs should be allocated to swordfish. For the purposes of this analysis, the percentage of per-trip revenues represented by swordfish (44 percent) (Larkin *et al*., 1998) was multiplied by the average variable cost per trip ($7,331) to obtain an estimate of the average variable cost per trip allocated to swordfish ($3,226). This was then subtracted from the average swordfish revenues per trip ($6,138). Finally, the average crew and captain's shares of payments (55 percent) were subtracted to obtain swordfish net revenues per trip ($1,310); this is the estimate of the average swordfish revenues available to the vessel owner after the above expenses have been paid. As shown in Table 7.6, swordfish net revenues represent 21.3 percent of gross revenues.

Estimates of the present value of net swordfish revenues were then obtained by multiplying the estimates of gross revenues by the net revenue percentage described in Table 7.6.[1] Both the gross and net revenue estimates for the three alternatives are summarized in Table 7.4.

Table 7.4 Summary of the economic impacts of swordfish quota alternatives.

U.S. Rebuilding Period Quota (mt ww)	Time to Rebuild	Economic Impacts
0	3 years	-PV of Gross Revenues 1999-2008: $95.3 Million -PV of Net Revenues 1999-2008: $20.2 Million
1,740	6 years	-PV of Gross Revenues 1999-2008: $96.6 Million -PV of Net Revenues 1999-2008: $20.5 Million
2,320	10 years	-PV of Gross Revenues 1999-2008: $93.7 Million -PV of Net Revenues 1999-2008: $19.9 Million

[1] A net revenue percentage was used because it simplified the comparison of cost data from the Larkin study (expressed on a per-trip basis) and gross revenue estimates (performed on a per-weight basis). However, the results would have been identical had the Larkin cost estimates been converted to a per-weight basis.

Table 7.5 Average Variable Cost Per Pelagic Longline Trip. (Source: Larkin *et al.*, 1998)

Cost Category	Average
Light Sticks	$801
Fuel	$1,400
Bait	$1,506
Ice	$384
Groceries	$617
Miscellaneous	$2,623
TOTAL	**$7,331**

Table 7.6 Per-trip swordfish net revenues as a percentage of per-trip swordfish gross revenues.

Average Swordfish Revenues Per Trip	$6,138
Average Variable Cost Per Trip	$7,331
Swordfish Revenues as percent of Total Revenues	44%
Average Variable Cost Per Trip Allocated to Swordfish	$3,226
Swordfish Revenues Less Variable Costs	$2,912
Average Crew and Captain's Share (%)	55%
Average Crew and Captain's Shares ($)	$1,602
Average Net Revenues Per Trip	$1,310
Net Revenues as Percent of Gross Revenues	**21.3%**

7.6.4 Economic Impacts of Shark Rebuilding Alternatives

The economic impacts of the shark rebuilding alternatives are discussed below. The primary differences between the alternatives analyzed are the quotas and the allocation of the quota to different species groups. Present values were estimated by first calculating the total shark gross revenues (based on the alternative quotas for each species group) and the total shark net revenues (equal to the estimate of variable costs subtracted from the estimate of gross revenues.) This section includes the methods and results for the PVA on the commercial rebuilding alternatives and a description of the economic aspects of the recreational fishery.

7.6.4.1 Present Value Analysis for Large Coastal Sharks

This section describes the data and methods used to estimate the present value of the commercial large coastal sharks fishery under the rebuilding alternatives considered. The results of the estimated present value analysis of net and gross revenues for the commercial fishery can be found in Table 7.7. Discussions of the economic impacts of each individual alternative can be found in Chapter 3.

A time frame of 30 years (consistent with the projections provided in the 1998 Shark Evaluation Workshop) and a discount rate of seven percent were used in order to calculate the present value of the commercial large coastal sharks fishery under the alternatives presented in Chapter 3. The annual gross revenues were calculated by multiplying the quota (lb dw) by the average price ($/lb dw). Net revenues are estimated by subtracting variable costs from the estimated gross revenues.

Currently, there is no comprehensive set of cost data specific to the Atlantic shark fishery. However, the pelagic longline logbook trip summary form does provide a form for fishermen to voluntarily provide cost information. Larkin *et al*., (1998) summarized some of these voluntarily provided data. Due to the lack of comprehensive cost data on the shark fishery, the analyses described here assume that costs for the pelagic longline fleet are similar to the cost of bottom longline, pelagic longline, and gillnet vessels in the directed shark fishery. In order to tailor the available data to the shark fishery, only the costs reported for vessels between 30 to 49 feet in length were used.

Larkin *et al*. (1998) reported that the total average variable cost of vessels in this length group is $3,683 per trip. These vessels land on average 15.4 sharks, 16.7 swordfish, 10.4 dolphin fish, 6.7 tuna, and 2.3 other fish per trip. Using average weight and price data obtained from logbook and dealer data, NMFS estimates that sharks provide only 11.8 percent of the total gross revenue from these trips. Because sharks provide only a fraction of the gross revenue for these trips, the entire cost of each trip was not allocated to the shark revenues. Similar to the swordfish analysis, NMFS used the percentage of revenues that sharks represent as a proxy for shares in total cost. Thus, 11.8 percent of the total variable costs per trip, or $435 (11.8 percent x $3,683), was allocated to sharks. The average cost per lb dw of each shark landed is estimated at $0.66 ($435/trip divided by 15.4 sharks/trip x 43 lb dw/shark). Further research and data collection may produce a better estimate of the cost of shark, but the use of the percentage of revenues approach is the best approach given the data currently available. The figures used to calculate the average cost per lb dw of sharks are in Table 7.8. To calculate the total cost of catching sharks, the average cost of each shark landed ($/lb dw) was multiplied by the quota (lb dw). Gross profits are estimated by subtracting the cost from the gross revenue.

One further step is required to obtain an estimate of net revenues; the owner's share of gross profits must be estimated and applied to gross profits. The owner's share of the gross revenues was estimated from two studies. Larkin *et al*. (1998) calculated the owner's share for vessels between 30 and 49 feet in length to be 48.8 percent of the

gross profits. McHugh and Murray (1997) calculated the owner's share of the gross profits, since the implementation of the Atlantic shark FMP, to be 41 percent of the gross profits. Both figures were used in order to calculate a range of net revenues.

Different scenarios are presented for the present value analyses of gross revenues for the status quo alternative because the latest stock assessment indicates that quota level may not be attainable due to decreasing stock levels. Under the first scenario, the current quota, and therefore the harvest, remained at 1,285 mt dw for 30 years. The present value of gross revenues is estimated to be $41.3 million. The present value of net revenues is estimated to be between $7.4 and $8.8 million (Table 7.7). Under the second scenario, the quota is assumed to be unattainable due to decreasing stock levels. For this alternative, the current quota was reduced by ten percent each year. Ten percent is the reduction in abundance estimated per year by looking at the Bayesian model projections from the 1998 SEW Final Report. A ten-percent reduction each year for 30 years reduces the quota a total of 96 percent. This is similar to the 94 percent reduction estimated from the status quo level (217 thousand fish) to the expected catch per year in 30 years (13.8 thousand fish) projected in the 1998 SEW Final Report. With the ten- percent annual reduction, the present value of gross revenues is estimated to be $19.3 million while the present value of net revenues is estimated to be between $3.4 and $4.1 million (Table 7.7). This second scenario is used as the baseline status quo for the present value analysis because the quota is not expected to be sustainable under the status quo during each year of the rebuilding period due to ongoing decline of the stock. Thus, while some of the following alternatives propose quota reductions, they may indicate *increases* from the status quo estimates of the present value of gross and net revenues because they assume that the entire quota under consideration can be landed during each year of rebuilding.

Other options considered include reducing the status quo quota by different amounts. These options may increase the severity of short-term economic impacts. However, not all of these options would minimize the long-term impact (i.e., the stock may still become commercially extinct). The present values of some of these options are shown in Table 7.7.

Table 7.7 Summary of the estimated gross and net revenues under the shark rebuilding quotas considered.

	Gross Revenues	**Net Revenues (McHugh and Murray, 1998)**	**Net Revenues (Larkin *et al.*, 1998)**	**% change in Net Revenues from Status Quo**
Status quo (1,285 mt)	$41,306,012	$7,379,443	$8,776,340	114% increase
Status quo reduced by 10% each year	$19,297,958	$3,447,638	$4,100,261	--
20% reduction (1,028 mt)	$33,044,809	$5,903,554	$7,021,072	71% increase
40% reduction (771 mt)	$24,783,607	$4,427,666	$5,265,804	28% increase
60% reduction (514 mt)	$16,522,405	$2,951,777	$3,510,536	14% decrease
50% reduction (642 mt)	$20,636,934	$3,686,850	$4,384755	7% increase
Closure	$0	$0	$0	100%
Closure for 20 years	$6,387,167	$1,141,086	$1,357,089	67% decrease
Split quota Ridgeback - 591 mt Non-ridgeback - 218 mt *	$25,721,372	$4,529,559	$5,386,985	31% increase
Split quota, minimum size Ridgeback - 650 mt Non-ridgeback - 218 mt * (Final Action)	$31,771,783	$5,589,838	$6,647,971	49% increase
Split quota, minimum size Ridgeback - 650 mt Non-ridgeback phased-in over 4 years- 218 mt *	$32,936,102	$5,793,136	$6,889,752	40% increase
Ridgeback open (650 mt) Non-ridgeback closed 20 years (650 mt) *	$23,889,838	$4,213,598	$5,011,214	22% increase

* These alternatives do not consider the economic impact that the public display quota may have because the public display quota is only a small percentage of the entire large coastal sharks quota. Also, NMFS does not have economic data on the public display portion of the fishery. In some cases, collectors sell sharks to aquariums; in others, aquarium staff collect their own sharks. Thus, the actual increase in revenues expected from these alternatives may be slightly overestimated.

Table 7.8 Calculation of the average cost per pound dressed weight of sharks.

Average variable cost per trip	$3,683.00
Average number of sharks landed per trip	15.4
Average weight of large coastal sharks	43.0 lb dw
Total weight of large coastal sharks landed per trip (15.4 sharks x 43 lb dw)	663.3 lb dw
Percent gross revenue per trip from sharks	11.8 %
Average cost per trip for sharks (11.8% x $3,683.00)	$435.45
Average cost per lb dw of each shark landed ($435.45/663.28 lb dw)	$0.66

7.6.4.2 Shark Angler Consumer Surplus

NMFS has few data on the shark recreational fishery. NMFS knows of only one study in recent years which assessed the economic value of the Atlantic shark fishery. Fisher and Ditton (1992) found that shark anglers spent an average of $197 per trip and were willing to spend an additional $105 per trip rather than stop fishing for sharks. They calculated that $172,542 was spent on average per year for shark fishing trips and the annual ACS was equal to $93,030 for a total gross value of $267,572. This study was performed before implementation of the 1993 Shark FMP. However, as Fisher and Ditton (1992) found that many anglers release the sharks they catch, it is unlikely that the FMP or the decreased recreational retention limit in 1997 would cause these estimates to change. Further discussion of the economic aspects of the recreational shark fishery can be found in Chapter 2.

NMFS does not expect the ACS of the shark recreational fishery to change with the implementation of the final action. NMFS does not believe anglers will stop fishing for sharks because so many anglers fish for the sport and release many of the sharks caught. Also, most shark anglers prefer to target pelagic sharks such as makos and blues. The final action will still allow anglers to land these fish. In fact, the minimum size may increase ACS as the challenge of catching a large shark may draw more anglers to the sport. Some commenters supported the Fisher and Ditton study (1992), indicating that they fish for sharks and use catch and release techniques. However, some commenters suggested that the proposed alternative of a catch and release fishery only for large coastal sharks and small coastal sharks would eliminate the recreational shark fishery. Further discussion of the impacts of the alternatives considered on ACS can be found in Chapter 3.

7.6.5 Unavoidable Adverse Impacts

Many of the final actions may have adverse economic impacts for the fisheries involved. However, all of the final actions were chosen explicitly to aid in rebuilding overfished stocks and to prevent overfishing in the future (the over-riding goals of this FMP and the Magnuson-Stevens Act). In addition, many of the final actions were chosen based on comments received during the public comment period. Once the stocks are rebuilt they should be both biologically and economically sustainable. In their current condition, the overfished HMS stocks are neither. For these reasons, the adverse economic impacts are unavoidable.

The final actions should minimize the economic impacts in the long term even though they may have severe economic impacts in the short term. Without management, Atlantic tuna, swordfish, and shark stocks will remain overfished and would not be rebuilt within the constraints of the Magnuson-Stevens Act. In the absence of additional management measures limiting fishing mortality rates, the stocks will decline to further unsustainable levels. The potential adverse biological, social and economic impacts associated with further decline of these stocks will be avoided with implementation of these management measures which are intended to rebuild Atlantic HMS stocks to the maximum sustainable yield level.

7.6.6 Irreversible and Irretrievable Commitments of Resources

There are no irreversible or irretrievable commitments of resources associated with the final actions. If actions are not taken to reduce fishing mortality and bycatch rates, Atlantic tuna, swordfish, and shark stocks will continue to decline and the fisheries they support could disappear.

7.6.7 Summary of Expected Changes in Net Benefits

Bluefin Tuna

Conducting present value analyses of commercial and recreational net economic benefits is an important part of comparing the bluefin tuna quota and allocation alternatives. The analyses indicate that the final actions to rebuild the bluefin tuna stock neither maximize nor minimize the net economic benefit from the bluefin tuna fishery. This reflects the fact that while the primary goal of this FMP is to prevent overfishing and rebuild overfished stocks as defined in the Magnuson-Stevens Act and the 1998 ICCAT recommendation, the economic consequences of rebuilding are an important secondary consideration.

This RIR also analyzed the impacts of a mid-Atlantic time/area closure on the commercial pelagic longline fisheries as a whole. This analysis found that overall, this time/area closure should have little economic impact on the entire fishery, either negative or

positive. However, the time/area closure may have an impact on individual fishermen or producers near that area. These impacts are discussed in the FRFA.

In addition to the final rebuilding actions and the mid-Atlantic time/area closure, other final actions may affect the net economic benefit from the bluefin tuna fishery. These expected effects are discussed qualitatively in Chapter 3, but are difficult to quantify, and therefore are not discussed in this RIR. For similar reasons, the impacts of the 1999 effort controls for the bluefin tuna fishery are discussed in Appendix 3.

Swordfish

A PVA was also important in comparing the different swordfish quota alternatives considered. The analysis indicates the alternatives analyzed are estimated to result in similar present values of gross and net revenues. The net economic benefit of status quo and adopting an ICCAT rebuilding program were not analyzed using a PVA but are discussed in Chapter 3. Status quo is expected to result in decreasing catches, and thus would likely result in lower net benefits than the alternatives analyzed. The adoption of an ICCAT rebuilding program, on the other hand, could not be quantified because there is currently no ICCAT rebuilding program in place. However, the PVA may help the United States develop a ten-year rebuilding program at ICCAT. In addition to quotas, some of the final actions may also affect the net economic benefit from the swordfish fishery. These are discussed in Chapters 3 and 4. Finally, any benefits from recreational fishing are not quantified here. At present, they are negligible, but as stocks rebuild, the ACS from this fishery should increase.

Sharks

Unlike swordfish and bluefin tuna, all of the final actions for shark rebuilding may have a significant impact on the commercial shark fishery. Discussion of the individual alternatives may be found in Chapters 3 and 4.

As described in Chapter 3, NMFS will split the large coastal sharks management group into two smaller groups and reduce the total large coastal sharks quota by 32 percent. In addition, NMFS will count dead discards and state landings against the commercial quotas and take off a small percentage for a scientific quota. Together, these alternatives may result in a large decrease in commercial landings especially in the large coastal sharks and pelagic fisheries. In recent years, dead discards have amounted to between five and ten percent of the large coastal sharks commercial quota. Under the final action, applying this five to ten percent range would translate to reductions of 31 to 62 mt of the ridgeback quota and ten to 20 mt of the non-ridgeback quota. State landings after federal commercial closures are estimated to be between 32 and 52 percent of the large coastal sharks commercial quota or approximately 198 to 322 mt of the ridgeback quota and 63 to 102 mt of the non-ridgeback quota. Together, these alternatives may result in an annual ridgeback commercial quota as low as 236 mt and an annual non-ridgeback commercial quota as low as 74 mt (Table 7.9). Other actions, such as season-specific adjustments, the large coastal sharks commercial retention limit, prohibited species, and limited access, may help to minimize the economic impacts by allowing fishermen to plan their fishing season and by reducing the derby fishery.

In addition, several Atlantic and Gulf of Mexico states have recently implemented or are considering implementing shark regulations consistent with federal sharks regulations such that the impacts of the final action to count dead discards and state landings after federal closures may be substantially reduced. In the long-term, the final actions for the commercial large coastal sharks fishery should allow these sharks to be rebuilt to biologically and economically sustainable levels. However, in the short-term, the final actions may essentially eliminate the large coastal sharks directed fishery.

The landings of the commercial pelagic shark fishery are also being reduced. In this case, the possible reductions reduced by the adoption of a separate quota for blue sharks. Additionally, as most pelagic shark fisheries operate in federal waters and not in state waters, the final action to count state landings after federal closures (should the federal season close) against the federal quota is expected to have negligible impacts.

Similarly, as most small coastal sharks that are not landed are used for bait so that dead discards are minor, no reductions in the commercial small coastal sharks quota from the final action to count dead discards against the quota are expected at this time. However, the final action to count state landings after federal closures (should the federal season close) may have substantial impacts in the future if states do not adopt regulations consistent with federal restrictions and landings in state waters after federal closures are large.

Together, the combination of final actions of quota reductions, minimum sizes, gear prohibitions, species prohibitions, and limited access may result in the elimination of the directed commercial fisheries for large coastal sharks, pelagic sharks, and small coastal sharks in the U.S. exclusive economic zone. During the rebuilding period (which could be as long as 39 years), the commercial shark fisheries may actually consist of fishermen targeting other species but catching and, to the extent consistent with rebuilding, landing sharks incidentally.

Table 7.9 Possible reductions in commercial quotas if dead discards and state landing proportions remain constant. Dead discard percentages for large coastal sharks are between 5 and 10 percent of the commercial quota. State landings of large coastal sharks are between 32 and 52 percent of the commercial quota.

Species	Final Quota (mt)	Dead Discards (mt)	State Landings (mt)	Available Quota (mt)	Reduction from Quota
Ridgeback	620	31 - 62	198 - 322	236 - 391	38 - 63%
Non-ridgeback	196	10 - 20	63 - 102	74 - 123	38 - 63%
Pelagic with Blue sharks	488	138 - 503	NA	(-15) - 350	(-3) - 72%
Pelagic without Blue sharks	488	29 - 98	NA	390 - 459	80 - 94%

7.7 Final Regulatory Flexibility Analysis

This section presents the FRFA for this FMP. Completion of the FRFA is required by the RFA for those regulatory actions having a significant economic impact on a substantial number of small entities. This section begins with a brief description of the RFA requirements and NMFS' definition of the universe of affected small businesses. Sections 7.7.4 and 7.7.5 describe the final actions in relation to fishing costs and gross revenues. These discuss whether the measures have a significant economic impact on a substantial number of small entities. Section 7.7.6 discusses what NMFS has done to minimize the impacts. Section 7.7.7 discusses other issues raised during the comment period and Section 7.7.8 has the conclusions.

7.7.1 RFA Requirements

The RFA requires agencies to assess impacts of their proposed regulations on small entities, and it is intended to encourage Federal agencies to utilize innovative administrative procedures when dealing with small entities. Please note that even if a significant impact on small entities is found, "[t]he RFA does not require that agencies necessarily minimize a rule's impact on small entities if there are significant legal, policy, factual, or other reasons for the rule's having such an impact" (SBA, 1998).

Under RFA, an initial regulatory flexibility analysis (IRFA) must be published and available for public comment unless the agency can certify that the rule will not have a significant economic impact or for each rule for which notice or comment is required. The IRFA should describe the impacts of the proposed alternatives on small entities and describe any alternatives that would minimize the impact while accomplishing the stated objectives (SBA, 1998). On October 25, 1998, NMFS made a preliminary IRFA available in the draft FMP. A revised IRFA, with a complete limited access analysis, was released with the proposed rule in January 1999. The comment period for these IRFAs ended on March 12, 1999. This final FMP responds to many of the comments received during the comment period. The comments and responses can be found in Appendix 8.

Also under RFA, a FRFA must be completed for all final rules unless there was a certification that the rule will not have a significant economic impact. The purpose of the FRFA is to address the concerns raised in the public comments in response to the IRFA, describe the impact of the rule on small entities, and explain any steps the agency has taken to minimize the impact of the rule on the small entities (SBA, 1998). This chapter contains the bulk of the FRFA for this final FMP, although additional economic impacts are discussed under each alternative in Chapter 3.

7.7.2 The NOAA Guidelines

A "small entity" includes small businesses, small organizations, and small governmental jurisdictions. The SBA considers a small business in the commercial fishing industry as a firm with annual receipts averaging over three years up to three million dollars annually. For processors, a small business is one with 500 or fewer employees; the wholesale industry size standard is 100 or fewer employees. A small organization is defined as any non-profit

enterprise that is independently owned and operated and is not dominant in its field. Every participant in HMS fisheries can be defined as a small entity.

NMFS' permitting and reporting requirements for HMS provide detailed information about the amount of HMS caught and landed by vessels. From these records, the gross revenues of vessels that land HMS can be estimated. Information about costs, however, is not regularly collected under these requirements. Limited cost data are available from NMFS-sponsored studies, but these studies have several shortcomings. First, they tend to cover only a portion of the vessels affected by the FMP. Second, the studies present cost averages rather than vessel-specific costs. As a result, cost data available to NMFS are not as comprehensive as revenue data available to NMFS, and the average cost data are not directly comparable with the vessel-specific revenue data. There is nothing to preclude any small business from providing voluntarily and on its own initiative any cost data to NMFS for consideration in preparing a IRFA or FRFA. However, no such data have been forthcoming during the entire process of FMP development. In light of the available data on the costs of vessels that land HMS relative to the data on revenues, NMFS has quantitatively analyzed the economic impacts of the FMP in terms of changes in gross revenues. Changes in the quota are likely to impact vessels' gross revenues, not costs. NMFS has considered subtracting the average costs (Larkin *et al*., 1998) from each vessel's gross revenues. However, this approach would be equivalent to removing a constant, and would have the same result as not using this average.

7.7.3 Description of Small Entities to which the Final Actions May Apply

Defining the universe is important under RFA. An overly restrictive definition may result in a universe that is too small and would overstate the economic impacts, while an overly inclusive definition may result in a universe that it is too large and would understate the economic impacts. NOAA considers only those entities that will be directly as well as indirectly impacted by the proposed action. Therefore, permit holders provide the most appropriate basis for determining the universe.

Logbook data indicate that fishermen routinely enter and exit HMS fisheries and this dynamic participation suggests that the universe should not be limited only to "active" participants; i.e., those who landed HMS in a given year. For example, NMFS found that of the over 2,000 permitted shark fishermen in 1995 and 1996, only 352 landed at least one large coastal sharks in both years. However, in both years over 500 fishermen landed at least one large coastal sharks; additional fishermen landed pelagic and small coastal sharks. Limiting the universe to the 352 permit holders who participated in the large coastal sharks fishery in both years would ignore the potential loss of opportunity experienced by permit holders who did participated in only one of those two years but who are regularly "active" in the fishery. Logbooks also show the multi-species nature of HMS fisheries. Few fishermen rely solely on one species of HMS or even on multiple species of HMS. Instead, fishermen fish for, and rely on, other species in addition to HMS including but not limited to mackerel, snapper-grouper, reef fish, dolphin, and oilfish. Previous studies in the area of natural resource valuation have shown that people, including fishermen, value the mere existence of opportunities regardless of whether they actually make use of them or not, and are willing to

pay for the existence of options, which is separate from the profit that they could earn from exercising those options.

Thus, the final rebuilding and limited access actions could have two *different* types of impacts depending on whether or not a permit holder actively fished for a given HMS. A quota reduction or limited access exclusion would not have a negative impact on permit holders who did not actively fish for HMS in 1997, other than lost fishing opportunities. Lost fishing opportunities are difficult to quantify, however, and have not been modeled. Permit holders who actively fish for HMS could experience a wide range of economic impacts depending on a variety of factors, including their ability to derive revenue from HMS fisheries, their productivity in harvesting HMS, their ability to continue harvesting HMS before quotas are reached, and the extent to which the permit holders derive revenue from other fisheries or other non-fishing sources. For the purposes of RFA, the impacts have been modeled in terms of reductions in gross revenues from HMS landings that result from the preferred rebuilding and limited access alternatives. However, these alternatives affect or have the potential to affect all permit holders regardless of their level of activity.

As described above, NMFS believes all permit holders in a particular fishery may be affected by any of the alternatives for that fishery, whether they actively participate in a given year or not. (The number of permit holders in this overall universe varies depending on which species or group of alternatives was being analyzed). However, due to concerns about "the diluting effect" raised in earlier analyses of potential economic impacts on small entities, this FMP demonstrates the results using smaller universes (Table 7.10). Looking at smaller universes also helps NMFS evaluate the impacts on different levels of fishery participation. Please note that if an alternative proves to have a significant impact with a large universe, it will also have a significant impact, albeit a larger one, on a smaller universe. The first of these smaller universes is the subset of permit holders who caught at least one relevant HMS in 1997 (i.e., swordfish permit holders who landed at least one swordfish in 1997, shark permit holders that landed at least one shark in 1997, etc.). The second is those permit holders who qualified for limited access (does not affect bluefin tuna). This universe is especially important for determining the impact of all the final actions on those fishermen who will constitute the entire universe once limited access is implemented.

Table 7.10 Definitions of Universe of Small Entities Potentially Affected by Alternatives

Species	Universe 1: Permit Holders in 1997	Universe 2: Permit holders who caught at least 1 HMS in 1997	Universe 3: Permit holders who qualify for Limited Access
Swordfish	1,177	274	416
Sharks	2,101	802	789
Bluefin Tuna	12,425	1,128	NA
Swordfish/Sharks	2,101	851	789

7.7.4 The Final Management Measures and Fishing Costs

All HMS fishing firms fall under the definition of small businesses. Because there are no large entities among the fishing firms, there are no differential effects between small or large entities.

Much of the focus in the rebuilding programs of this FMP is on the overall level of catch, thus the FRFA analyses center on impacts on gross revenues of small businesses. In some cases, reductions in quotas can lead to increases in costs if vessel operators increase fixed or variable input use (i.e., sonar, more fuel, better bait/gear) in an effort to give them an advantage in a derby fishery. However, most HMS fisheries have already been under derby fishing conditions for a number of years, and it is unlikely that the additional quota cuts proposed would significantly increase fishing costs.

Nevertheless, several of the final actions in the FMP are likely to directly affect fixed and/or variable costs of fishing and thus must be addressed in the FRFA analysis. While costs data -- and thus net revenue data -- are sparse, NMFS has some information on fishing costs for bluefin tuna and longline vessels (both pelagic and bottom). These can be helpful in assessing the relative impact of increased fishing costs on small businesses in the fishery. However, because costs and/or net revenue data are available only in aggregate, average form, the FRFA analyses cannot be conducted on an individual vessel basis, as is done for the gross revenue analyses. Also note that due to the multi-species and multi-natured operation of HMS fishing vessels (i.e., wide range in vessel size, mileage per trip, geographic differences in fuel costs, etc.), averages should be used cautiously.

7.7.4.1 Financial Conditions of Different Fishing Sectors

Several efforts have been launched to improve the quantity and quality of social and economic data and analyses on HMS fisheries, both recreational and commercial. For the purposes of this section, the focus is on fishing costs, and therefore net revenues, for commercial fishing vessels. These initial efforts have focused on variable costs of fishing, which can be used to determine profitability of fishing trips and provide some indication of cash flow to fishing firms. Available data and analyses for the different fishing sectors are discussed below.

For all the studies described below, fishing costs are limited to variable costs. Fixed costs include vessel payments and/or depreciation, which are unknown. While it is difficult to discern a clear picture of the overall financial condition of fishing firms, it is likely that there are numerous firms that are operating at the margin (McHugh and Murray, 1997). Longline firms are typically under considerable financial stress, due to depressed prices, reduced resource availability and/or quotas, and increased costs of access to shoreside property. While a few firms are likely to continue to be highly profitable, there is more evidence of financial difficulty. The bluefin tuna, swordfish, and shark fisheries have been particularly affected by low prices in the past few seasons.

Returns to the vessel owner are necessary to cover fixed costs, the opportunity cost of capital, and a salary to the captain. Using the average returns to the vessel owner per trip ($4,422) and the average number of trips per year (12), vessel owners receive an

annual payout of $53,064. These funds appear to be very marginal, and make it unlikely that considerable capital outlays would be possible.

Pelagic Longline

One important source of information on the general financial condition of longline fishing firms is from the preliminary data analyses conducted on the pelagic longline fishery (Larkin *et al*., 1998). These researchers analyzed data being collected in a voluntary add-on to the pelagic logbook trip summary form. Average variable costs per fishing trip was $7,331, with bait, fuel and light sticks comprising the majority of non-labor expenses. Average trip earnings for vessel owners were $4,422 per trip, while the captain (if different from the owner) and the crew had per trip earnings of $1,521 and $3,903 (average $978 per crew member), respectively. The average returns per trip increased with vessel length, from $2,271 for the smaller vessels to $9,305 for the largest. It was also noted that the proportion of supply costs going toward fuel increased from 25 percent for the shortest vessels to 33 percent for the longest. Overall, vessels averaged 12 trips per year which lasted ten days, and during which they placed five sets.

Bottom Longline

McHugh and Murray (1997) conducted a survey of shark vessels volunteering to provide financial information in a two-part survey. They found that the greatest costs for a shark fishing trip are payments to the crew (usually on a share basis), followed by bait and tackle, food, and fuel. The researchers noted that there is no unambiguous method for calculating profits from a shark trip. In their study, profits per trip are estimated by starting with the owner's share of total catch and subtracting all expenses other than those for food, which are normally taken out of the crew's share of the revenues. Profits for a seven-day trip average $1,589 for all vessels, and $1,975 for vessels in the 40- to 49-foot range. Trip profitability was shown to be unrelated to the proportion of catch that is shark, but positively related to fishing trips taken in for the 1994 and 1995 fishing season (prior to the commercial retention limit). McHugh and Murray (1997) also note that most vessels in the shark fishery are older than their "taxable life", and thus would only have salvage value. McHugh and Murray (1997) conducted statistical tests with the following results regarding profitability of shark-directed fishing trips:

- Profitability of the trip is unrelated to the proportion of catch which is shark;
- Profitability of a trip is negatively related to the length of the vessel, perhaps due to commercial retention limits or the fact that larger vessels tend to be older and less efficient;
- Profitability per day is not significantly related to the length of the trip; and,
- There is no seasonality in the profitability of trips.

While the Larkin *et al*.(1988) study focuses on the pelagic longline fishery, which covers primarily trips that are not targeted at large coastal sharks, the subset of vessels in the 30- to 49-foot category would be most likely to be representative of vessels that would target and/or land sharks. Indeed, in this category, a higher percentage of fish landed were sharks than for vessels in a larger size category. For the smaller size category for pelagic longline vessels, variable costs per fishing trip were shown to be around $3,683, with gross revenues ranging from $5,954 to $7,145. Total returns per trip (payments to owner, captain, and crew), therefore, ranged from $2,271 to $3,462. Since the Larkin *et al*.(1998) study found that trips averaged ten days, while the McHugh and Murray (1997) study found seven-day trips to be the average, the estimates of returns per trip are roughly equivalent between the two studies. Indeed, per-day profits for a ten-day trip were estimate by McHugh and Murray (1997) to be $273, for a figure of $2,730 per trip, close to the lower range in the Larkin *et al*. (1998) study.

7.7.4.2 Costs Resulting from the Final Management Measures

Time/Area Closure

The one-month time/area closure for pelagic longline vessels operating in the mid-Atlantic will directly affect the fishing costs of the vessels operating in that area. Time/area closures will force vessel operators who wish to continue fishing with pelagic longlines to displace their effort, thus increasing transit time (with a possible decrease in the number of fishing days per trip), and the amount of fuel and ice required for a trip. However, in some cases, the increased costs may be virtually insurmountable, particularly for smaller vessels, for which even an additional capital investment would not allow them to fish beyond the closed area. As McHugh and Murray (1997) demonstrate, fuel is one of the more important components of fishing costs. As noted below, time is also a costly factor in a derby fishery. Increases in fishing costs could trigger a significant impact determination. Together, the impact on both fishing costs and gross revenues for time/area closures in general could reduce profits could have a significant economic impact on a substantial number of small entities. However, given the comments received during the comment period and the fact that NMFS has reduced the size of the mid-Atlantic time/area closure to fit that asked for by the industry, NMFS does not believe that this final action, in and of itself, will have a significant impact on a substantial number of small entities.

Vessel Monitoring Systems

This FMP implements the requirement to purchase, and/or lease, and operate a vessel monitoring system on board pelagic longline vessels.

The cost of the vessel monitoring system ranges from $1,800 to $5,000 per vessel for the initial purchase of the equipment, including the transceiver and antenna. The less expensive units do not allow for two-way communication. Installation of the equipment may cost approximately $100. Communication charges for required automated position reports are about five dollars per day. Repair and maintenance costs may approach $1,000 per year but will depend on which unit the fisherman decides to purchase. Leasing arrangements are estimated at around $500 per year.

The acquisition of VMS is an increase in both variable and fixed costs. Fixed costs would increase by up to $5,000 (if the more expensive unit is purchased), while variable costs would increase by $1,000 per year for maintenance, and assuming that vessels fish 120 days per year according to Larkin *et al*. (1998), $600 per year for operation. If the equipment is leased rather than purchased, variable costs also increase by $500 per year for leasing fees. The increase in fixed costs should be considered as a capital cost of compliance, and should be compared to the availability of capital based on cash flow. Given the description above of the difficult financial situation for most longline vessels, it is likely that the increased capital costs of compliance with the requirement for a vessel monitoring system would have a significant economic impact on fishing entities. The $5,000 required for purchase of a vessel monitoring system is nearly ten percent of all returns to the vessel owner, which must be used to cover all fixed costs as well as a salary to the vessel owner. The less expensive unit is nearly four percent of all returns.

Focusing on the variable costs of operating a vessel monitoring system (five dollars per day), if each trip averages ten days, the variable costs per trip increase by $50. In addition, each trip must account for the annual maintenance costs for operating a vessel monitoring system ($1,000 per year; $1,000 per 12 trips = $83). Therefore, a vessel monitoring system may increase per trip fishing costs by a little over $130 per trip. Given the overall average of $7,331 per trip in average costs, it is unlikely that the *variable* costs of operating a vessel monitoring system will increase costs by five percent for more than 20 percent of the small entities ($130 in additional fishing costs would be six percent of $2,000 in total fishing expenses; the latter is considerably less than the average).

These new regulations will allow pelagic longline vessels to delay offloading of their swordfish following a directed fishery closure provided no fishing activity take place until all HMS are offloaded. It is also possible for vessels to fish in the south Atlantic during a closure in the north Atlantic, and transit the northern area. Therefore, the increased costs of compliance associated with a VMS requirement could be offset to some extent by increased prices for swordfish landed following closures.

Minimum Sizes

Because larger ridgeback sharks tend to be further offshore, the new minimum size for ridgeback sharks will likely require fishermen conducting directed shark fishing trips (mostly with bottom longline) to operate farther offshore, thus increasing transit time to and from the fishing grounds. The longer transit results in increased costs for fuel, ice,

and other costs. Additional "time" costs include the time necessary to sort and measure the sharks, which can slow the haulback. Time taken to transit, sort and measure can come at a considerable cost in a derby fishery, when the emphasis is on maximizing harvest during the limited amount of time. However, because the per-pound price of sharks tends to increase with average size, the increased fishing costs may be offset by a higher gross revenue per pound of shark landed. Also, limited access may help offset increased fishing costs, if a lower number of vessels are competing for the same amount of fixed quota. Finally, note that commercial retention limits for large coastal sharks can also limit the profitability of shark fishing trips.

Limited Access

While the emphasis in the limited access program is on rationalizing fishing capacity with the quota, and thus on reducing the "race for the fish" and the costs of catching those fish, limits on harvesting capacity on individual vessels can lead to "capital stuffing" of other inputs. Limited access essentially limits the number of vessels, which provides incentives for vessel operators to increase the fishing power of each one of these qualifying vessels. Therefore, most limited access programs include some measures to control increases in the fishing power of each of these vessels through limits on upgrading on either existing vessels or on transfer of the permit. The final action for this limited access program is to follow the upgrading limits proposed by the New England and Mid-Atlantic Fishery Management Councils, which allow for one upgrade, provided the upgrades do not exceed 20 percent of HP and ten percent of length overall (LOA), gross registered tonnage (GRT), and net tonnage (NT). Changes to LOA and GRT/NT must be performed at the same time. Vessel operators who qualify for a limited access permit, particularly the directed permit, would have a considerable incentive to invest in this upgrade. To the extent that transferability of the limited access fishing permits may result in the vessel operators holding a permit with a value greater than its purchase costs, there is some capital gain to offset possible increased capital costs. In any case, the regulations do not *require* an increase in fishing costs in order to be in compliance; the increase in costs will come from a decision by the vessel owner to invest in increased fishing power if necessary to compete in the fishery.

7.7.5 The Final Management Measures and Gross Revenues

As described in the revised IRFA, for the quantitative analyses of gross revenues, NMFS used vessel-specific 1997 landings data to analyze the economic impacts of the preferred limited access alternatives as well as the major rebuilding alternatives. The IRFA analyzed the alternatives both independently and in combination.

The true effect of these rebuilding alternatives probably occurs somewhere between the two assumptions analyzed: all effects distributed equally or highliners take a 25-percent cut. As such, many of the final actions may have a significant economic impact on HMS fishermen and may even force some fishermen out of business. However, as described below, these final actions both minimize the economic impacts over the long term and meet the explicitly stated goals of this FMP. None of the other alternatives considered accomplish

both goals. Therefore, none of the other alternatives are viable.

In the Bluefin Tuna Addendum, NMFS asked specifically for comments on the economic impact of the mid-Atlantic time/area closure. During the public comment period, NMFS received a number of comments suggesting NMFS change the proposed area due to safety concerns as well as the need to continue fishing in the southern part of the proposed closed area. The final action described in this FMP implements a time/area closure which is similar to the one requested by the industry. The ecological impacts of the new closure is equivalent to the proposed closure. In order to fully analyze the economic impacts of this closure on individual fishermen, NMFS is presenting the results of the analyses for this closure below.

Mid-Atlantic Time/Area Closure

NMFS realizes that the severity of impact of any time/area closure varies for each fisherman. For instance, pelagic longline fishermen who fish only in the Gulf of Mexico should not be impacted by this time/area closure. However, pelagic longline fishermen who normally fish in the area around the closure may be severely impacted. For this reason, NMFS considered the impact of the preferred regulation on different fishermen including all HMS longline permit holders (shark, swordfish, and Atlantic tuna incidental), those longline permit holders who fished above 30° latitude, those longline permit holders who fished above 39° latitude, and those longline permit holders who fish during the year in the closed area. The number of HMS longline fishermen for these groups ranged from 61 to over 2,000 fishermen.

NMFS calculated the total gross revenues for each fisherman in each group using the average weights and ex-vessel prices for 1997. The gross revenue earned during June from the closed area was subtracted from each fisherman's annual gross revenue from all areas. The percent reduction in annual gross revenues for each fisherman was then calculated. This analysis assumes that any gross revenue obtained during the time/area closure would be lost to the fisherman. This is not realistic because most fishermen would continue to fish in other areas and thus continue to earn revenues during the closure. Also remember that because this regulation does not decrease the quota in any fishery, fishermen still have the opportunity to land the same amount of fish that they usually do. In the proposed rule, NMFS noted that the proposed time/area closure should not have a significant impact and specifically asked for comments on this topic. However, because NMFS has changed the area based on public comments and a discrepancy found in the time/area closure analysis (Appendix 6), NMFS is presenting an additional analysis here. Please note, this analysis is different from the rebuilding analyses presented in the IRFA in that it assumes every fisherman fishing in the closed area is impacted.

NMFS found that the final time/area closure would reduce the gross revenues of 11 fishermen by over five percent in 1997 and 22 fishermen by over five percent in 1996 if the fishermen fish only in the closed area. NMFS heard in comments that most fishermen follow the Gulf Stream from the south and travel north towards the closed area. Also, a number of commenters asked NMFS to change the area to make it safer to travel across the Gulf Stream to the surrounding areas. Thus, according to the comments, even the fishermen agree

they would not stop fishing for the month of June. Thus, although this action, in and of itself, may have a significant impact on a few fishermen, NMFS does not believe it will have a significant economic impact on a substantial number of fishermen.

7.7.6 Minimizing Impacts on Small Entities

Rebuilding Alternatives - General

Quotas are the primary components of the final rebuilding alternatives for HMS. In the case of bluefin tuna, the annual quota was actually increased slightly. This level will remain intact unless future stock assessments indicate the need for an increase or decrease. For swordfish and bigeye tuna, NMFS establishes a foundation for a ten year international rebuilding plan. This rebuilding plan will be adopted if it is recommended by ICCAT. This rebuilding plan may include quota reductions. This final FMP implements fairly large quota reductions for large coastal sharks. As noted in the RIR, these quota reductions, in combination with the other final actions may virtually eliminate the large coastal sharks directed fishery. However, all quota levels are chosen in order to allow rebuilding of these overfished stocks to occur in as short a time period as possible given the biology of the species involved, and the mandates of the Magnuson-Stevens Act. Any longer time period (and therefore, smaller quota reduction) would not comply with the Magnuson-Stevens Act nor with the goals of this FMP. Thus, NMFS believes the final rebuilding actions meet the objectives of the FMP and are consistent with Federal laws. As stated in Section 7.7.1, NMFS is not required to minimize significant impacts if there are significant legal, policy, factual, or other reasons that the rule has such an impact.

In general, the final actions for all HMS minimize the economic impact in the *long term* by aiding in the rebuilding of these overfished stocks to a biologically and economically sustainable state as quickly as possible given biological and legal constraints. Indeed, as a stock rebuilds, not only will catch per unit effort increase but the cost per unit effort will decrease. Thus, variable costs for each fishing vessel should decrease. This may translate to larger net revenues for each vessel even if quota levels remain unchanged for the period of recovery. In addition, these gains are less apt to be "diluted" by new entrants attracted to the fishery by increased profits because limited access is in place.

While the final actions may minimize the impacts over the long term, the short-term impacts may cause some fishermen to go out of business. However, all final actions minimize the economic impacts in the long term to the extent practicable because they rebuild the resource and meet the objectives of this FMP. Other possible alternatives may have less of an economic impact in the short term, but do not meet the objectives of this FMP or the Magnuson-Stevens Act. Therefore, alternatives other than the final actions are not considered viable. Nevertheless, some of the final actions described below and in Chapter 3 may aid in mitigating the negative short-term impacts of the reduced quota alternatives. In addition, many of these rebuilding alternatives, such as counting dead discards against the quota, provide an incentive for fishermen to avoid areas with known high bycatch mortality. Thus, these alternatives may help to reduce bycatch mortality, another objective of this FMP.

Rebuilding Alternatives - Bluefin Tuna

In late 1998, ICCAT adopted a rebuilding program which included a small increase in the U.S. share of the quota. This quota should not have any negative economic impacts on fishermen. In fact, it may mitigate some of the impacts of the final actions, including the time/area closure, by permitting fishermen to land a few more fish.

In the draft FMP, NMFS considered a number of alternatives to rebuild tuna stocks including changing the allocation alternatives and the size limits. In both of these cases, NMFS decided to keep the status quo because the impact on rebuilding would not be as large as the economic impact on fishermen. Regarding allocation, NMFS is keeping the status quo and adding a cap to the purse seine fishery at this time. The purse seine cap limits the purse seine category to the same quota that was available in 1998. Thus, NMFS feels that this cap does not increase the economic impacts on this category but will discuss it with the Advisory Panel before making a final decision. NMFS believes that the final bluefin tuna rebuilding alternatives minimize the potential negative impacts, to the extent practicable, and are consistent with the objectives of this FMP.

Regarding the status quo, NMFS is maintaining the status quo minimum size for bluefin tuna because it was deemed to have the fewest negative economic impacts on the fishery as a whole while still allowing for rebuilding to occur. Increasing the minimum commercial size to 81 inches could increase fishing costs, thus affecting fishing vessels that are already at the margin. Decreasing the minimum size to 47 inches could allow additional vessels from the mid-Atlantic region to enter the fishery but could have negative impacts for fishermen in the New England area who are already in the fishery. Thus, the final action (status quo) allows for the rebuilding of the stock and has the least economic impacts in both the short term and the long term.

Rebuilding Alternatives - Swordfish

This FMP establishes the foundation for a ten year international rebuilding program. This rebuilding program has the longest rebuilding period allowed by the Magnuson-Stevens Act and should mitigate any economic impacts. The current quota would have few negative short-term economic impacts but would have substantial negative long-term impacts if the stock does not recover. On the other hand, a closure of three years has the most significant negative short-term impacts but large positive long-term impacts. The ten-year rebuilding alternative allows the stock to recover fairly quickly, thus allowing for positive long-term impacts including increasing net revenues and stabilization of the markets, but also does not force fishermen out of business, thus minimizing any short-term negative impacts. NMFS will analyze this quota reduction more fully once an ICCAT recommendation is made.

Other alternatives considered to enhance swordfish rebuilding until a rebuilding program is recommended by ICCAT include limited access, counting dead discards against the quota, requiring the use of a vessel monitoring system, and the Florida Straits time/area closure. While this time/area closure is not final at this time, NMFS believes time/area closures are an effective method of reducing bycatch. Use of all of these management tools, may permit

NMFS to reduce overfishing until an ICCAT rebuilding program is adopted, and thus minimize any negative economic impacts on the fishery of large quota cuts.

In the draft FMP, NMFS preferred the alternative to prohibit pelagic longline fishing in the Florida Straits from July through September in order to reduce the bycatch of small, immature swordfish. This time/area closure was designed to reduce the bycatch of undersized swordfish, with possible reductions in bycatch of blue marlin and sailfish, all overfished species. NMFS found that this time/area closure may have significant economic impacts on the 20 vessels which fish in this area. During the comment period, a number of commenters explained that the proposed time/area closure in this region would have a disproportionate economic impact but would not have a large impact on rebuilding. A number of commenters asked for a larger, more effective area despite the larger negative economic impacts expected. Some of these commenters included additional analyses. Because of these comments, NMFS has decided to maintain the status quo (no time/area closure) until additional analyses on the ecological and economic impacts of this area and larger areas can be performed. An additional rulemaking on this alternative is expected in 1999. Although the status quo (no time/area closures) will have no immediate economic impact on swordfish fishermen, this alternative is not expected to aid in reaching the main goal of this FMP: rebuild overfished stocks and prevent overfishing. Indeed, under status quo, bycatch of undersized swordfish may continue to contribute to the decline of the swordfish stock, resulting in a quota reduction and even greater economic impacts in the long term. Many of the commenters agreed that a time/area closure to reduce the bycatch of undersized swordfish is needed despite the economic hardships the fishermen might have to face.

Counting dead discards against the swordfish quota considers additional sources of mortality and will enhance the rebuilding program. This may have large negative economic impacts in the short term. However, this action is critical to rebuilding and maintaining a sustainable swordfish stock. A larger time/area closure which will reduce the number of dead discards in the swordfish fishery may aid in minimizing the negative economic impacts that this action may have. These two rebuilding alternatives provide an incentive for fishermen to avoid areas with known high bycatch mortality. Thus, these alternatives may help to reduce bycatch mortality, an objective of this FMP.

Although the acquisition of a vessel monitoring system has an initial cost, it will reduce costs to longline fishermen in the long term by permitting them to travel across the closed area rather than around the area. Also, a vessel monitoring system may minimize the impacts of any closures by providing for longer offloading windows, thus reaping higher ex-vessel prices. Limited access should decrease the latent effort, thus relieving the derby fishery and possibly reducing dead discards. The potential economic impacts of limited access are discussed below.

Thus, NMFS believes that the package of swordfish rebuilding final actions minimize negative economic impacts to the extent practicable while still being consistent with the over-riding goal of rebuilding overfished stocks and preventing overfishing. Neither quota cuts alone nor the other management tools alone would minimize the economic impacts while still achieving the rebuilding goal of this FMP.

Rebuilding Alternatives - Atlantic Sharks

For sharks, the potential negative impacts of the quota reduction on the commercial shark fishery is the largest of these three HMS groups. However, NMFS incorporated many of the suggestions and recommendations from the latest stock assessment (1998 SEW) including a minimum size on ridgeback sharks, protection for the dusky shark, and more species-specific management in order to minimize any potential negative impacts while still rebuilding the stocks. NMFS also considered the comments received and changed a number of the proposed alternatives accordingly. Changes to the proposed alternatives include allowing fishermen to land blue sharks under a new quota, increasing the porbeagle quota, and changing the recreational retention limits.

The final action on large coastal shark quotas will reduce the non-ridgeback shark fishery by 66 percent while leaving the ridgeback portion of the quota at status quo level with a minimum size. This selection should aid in rebuilding the stock and provides the longest rebuilding time period allowed by the Magnuson-Stevens Act. Compared to a few of the other alternatives considered, this action will minimize potential negative short-term economic impacts and negative long-term impacts. Quota alternatives considered which would have large negative impacts in the short term include maintaining the status quo, maintaining the large coastal sharks management unit and reducing the quota by 50 percent, and closing the large coastal sharks fishery. Maintaining the large coastal sharks fishery would require a larger total quota reduction than the final action thus increasing any negative short-term impacts to fishermen. Closing the large coastal sharks fishery maximizes the negative short-term impacts. In the long term, this alternative may rebuild the stock faster but the potential positive long-term benefits of this alternative, or the others listed above, do not outweigh the severe negative short-term impacts. The final action of splitting the large coastal shark fishery into two species groups reduces the need for closing the fishery or having an even larger quota reduction and thus, minimizes the potential negative short-term impacts while still achieving the long-term benefits. In addition, species-specific management tools give additional advantages to the fishermen.

Another quota alternative considered, the phased-in quota reduction for the non-

ridgeback sharks, might minimize the negative short-term impacts by giving fishermen a longer opportunity to consider other options. However, over the long term, it is unlikely the phased-in quota would have as great an impact on rebuilding as the final action. Despite the fact that the phased-in quota might minimize the negative short-term economic impact, NMFS does not believe this alternative is appropriate for a species group that requires such a long rebuilding period.

In addition to reducing the non-ridgeback commercial quota, this FMP implements a minimum size for ridgeback sharks. NMFS believes, based on the 1998 SEW, that a minimum size may reduce fishing mortality on the most sensitive sizes, if dead discards on these sizes do not increase fishing mortality, and thus increase the chance of rebuilding ridgeback sharks. Without the minimum size, the quota on ridgeback sharks would have to be reduced in order to meet the rebuilding goal of this FMP. Thus, the minimum size, although it may increase some costs (see Section 7.7.4), mitigates the economic impact in the short-term by allowing fishermen to continue to land approximately the same amount of ridgeback sharks as before this FMP and may increase ex-vessel prices. In addition, this final action also meets the rebuilding objective of the FMP and thus will have positive long-term economic impacts.

Other final actions for sharks may minimize the negative economic impacts on small entities in the short term and long term. These alternatives include prohibited species, commercial retention limits, changing the way the fishery opens and closes, changing the quota adjustments, time/area closures, increased restrictions on the recreational fishery, and limited access (discussed below). The final action for prohibited species should minimize the impacts by allowing landings of only the commonly landed species such as sandbar sharks and blacktip sharks. Thus, the quota will consist of only those species which fishermen seek to land. This action is expected to provide the incentive for fishermen to avoid areas with high catch rates of prohibited species. Costs may be increased as fishermen may need to spend additional time sorting and releasing species. However, in the long term, this alternative is expected to aid in rebuilding stocks and stabilizing the market. The other alternatives considered such as prohibiting commercial or recreational retention of all Atlantic sharks could have severe negative economic impacts for fishermen and related communities. Prohibiting possession of rare or seriously depleted species only, such as dusky sharks, may increase costs for fishermen by forcing sorting for only a few species and may increase dead discards if the costs of discarding one species is less than the benefits of landing another species. Also, prohibiting rare species now (such as dusky or night sharks) will have fewer potential negative impacts in the long term, especially if the species continues to decline and is listed as endangered according to the ESA or CITES. If the dusky shark is listed as endangered, the entire large coastal sharks fishery may need to be closed until the dusky shark is unlisted due to difficulties in identification, especially with the sandbar shark.

The status quo commercial retention limit also minimizes the potential negative economic impacts of the quota reduction. The 2,000-pound per trip retention limit might have large economic impacts by reducing the profitability of individual trips despite the minimum size final action which will force vessels further offshore. NMFS believes the other commercial retention limit alternatives considered (6,000 lbs dw or elimination), although

increasing the profitability of individual shark trips for some vessels, might decrease the length of the fishing season and exacerbate the derby conditions even if limited access is implemented. These alternatives also would permit the reduced quota to be landed by only a few larger vessels, thus having a disproportionate negative impact on smaller vessels.

This FMP implements the alternative of scheduling the openings and closures of the large coastal sharks fishery for specified periods with no inseason re-opening rather than the status quo (five-day closure notice) or increasing the closure notice to ten days. Scheduling the opening and closures of the large coastal shark fishery would increase the stability of the markets and have an immediate positive economic impact on the fishermen and related communities. Potential markets for large coastal sharks meat and fins could plan on receiving the product for a specific time period and could adjust ex-vessel prices accordingly. Note that supply stability is particularly important in the shark meat market where retailers require guaranteed delivery over a specified period, especially for pre-announced advertising specials. Fishermen could also plan on rigging vessels with the proper gear for the specified period and not have to worry about re-rigging later in the season if NMFS miscalculated the closure, thus costs may be less. Status quo or a longer notice of closure period, would not have immediate impacts. While extending the notice of closure to ten days might give the fleet more time to plan the rest of the season, it might also increase the possibility of exceeding the quota thus decreasing the following year's potential revenues. This would also increase the derby effect in the last few days of the season and increase market gluts, thus further decreasing ex-vessel prices. Therefore, scheduling the opening and closing of the fishing season mitigates some of the negative short-term economic impacts of the reduced quota while also supporting the over-riding rebuilding goal of this FMP.

NMFS does not believe that commercial fishermen should be fully responsible for rebuilding large coastal sharks. Therefore, this FMP implements a reduction in the recreational retention limit. Under the final action, shark anglers would be allowed one shark, any species, per vessel per trip as long as it meets the minimum size of 4.5-foot fork length. This alternative may have some negative short-term impacts on the ACS but will aid in rebuilding large coastal sharks. In order to minimize the impact on ACS, NMFS is also allowing an additional one Atlantic sharpnose per person per trip with no minimum size limit. NMFS believes that sharks caught recreationally have a high probability of survival and that many shark anglers already practice catch and release or set their own minimum size. Thus, the long-term benefits of this alternative outweigh the small negative short-term impacts. Although this is similar to the proposed alternative in the draft FMP, this alternative would allow landings of some of the larger large coastal sharks in addition to the pelagic sharks. Commenters noted that the catch-and-release program proposed in the draft FMP would have drastic negative short-term and long-term impacts on the recreational fishery. Reducing the recreational retention limit but allowing recreational fishermen to land large sharks should not impede the large coastal sharks rebuilding. Thus, the final recreational retention limit both minimizes the economic impacts for both recreational and commercial fishermen and will accomplish the rebuilding goal of this FMP.

As with bluefin tuna and swordfish, NMFS considered time/area closures in order to minimize the impact of counting dead discards and state landings against the quota.

However, for sharks, the large negative short-term economic impacts of the proposed time/area closure alternatives were unreasonably high. The reduced commercial quota for non-ridgeback large coastal sharks and the commercial minimum size on ridgeback sharks reduce the need for time/area closures, and that time/area closures may actually serve to maximize the negative short-term economic impacts rather than minimize them. Thus, the status quo (no time/area closures) is preferred in order to minimize economic impacts. NMFS will continue to work with the states to identify and, if appropriate, restrict fishing in nursery areas within state waters.

This FMP also implements counting all dead discards and state landings against the commercial shark quota. This alternative may increase the negative short-term economic impacts in the fishery including shortening seasons. However, over the long term, this action will support faster rebuilding and help stabilize the fishery. Also, if states decide to follow federal closures, counting state landings after a federal closure against the commercial shark quota will no longer have an impact on commercial fishermen. Thus, NMFS believes that accounting for all sources of mortality is consistent with the Magnuson-Stevens Act and any negative short-term economic impacts are outweighed by the potential long-term benefits.

Limited Access Alternatives

The final limited access actions will apply the criteria described in Chapter 4 to determine which vessels will be issued directed and incidental permits for swordfish and sharks. Implementing these alternatives will decrease the number of vessels permitted to land these species as compared to the status quo. The final actions for limited access help meet the goal of rationalizing the fishery to the available quotas. Also, these alternatives are chosen explicitly so as to minimize the impact on those fishermen who are substantially dependent on the fisheries. In theory, only those fishermen who do not meet the $5,000 gross revenue threshold in any two years will not qualify for the directed fishery. Fishermen who land a minimal number of fish (on average one fish per year) will qualify for an incidental limited access permit. NMFS received comments that these thresholds were too lenient. However, in this first step of rationalizing the fishery to the available quota these thresholds are appropriate in order to minimize economic impact. A few of the alternatives rejected in Chapter 4 would likely have a greater economic impact on those fishermen who are substantially dependent; others would have less of an economic impact but would not rationalize fishing capacity with the quota. Comments on the proposed limited access rules and from the HMS AP on the draft FMP indicate that the majority of fishermen and some major longline organizations enthusiastically endorse limited access in HMS fisheries.

In addition, limited access may help minimize the economic impacts of the final quota alternatives by limiting the number of vessels which are permitted to land sharks, tuna, and swordfish commercially. The final actions for limited access will also limit the incidental landings of sharks and swordfish for each vessel with an incidental permit, thus saving the majority of the quota for fishermen with directed permits. In combination with all the other final actions, limited access will help fishermen make the decision when to fish in relation to safety and where to fish in terms of deploying and retrieving gear. Limited access may also reduce discards and bycatch mortality by limiting the number of fishermen who are allowed

to fish. The fishermen who remain in the fishery will have a greater incentive to follow the regulations because they will be the ones who benefit the most from a rebuilt stock.

Fishing Capacity Reduction Program

Section 312(b) of the Magnuson-Stevens Act allows use of vessel or permit "buyback" programs as management tools. Buyback programs pay vessel owners to surrender fishing permits and/or withdraw vessels from fishing. Such programs reduce excess capacity, increase harvesting productivity of vessels that remain active in the fishery, and help conserve and manage fisheries. This type of management tool can only be implemented if: 1) the program is shown necessary to prevent or end overfishing, rebuild fish stocks, or achieve significant improvements in the conservation and management of the fishery; 2) there is a fishery management plan that prevents the replacement of fishing capacity removed by the program and establishes a specified or target TAC which triggers closure of the fishery; and 3) the program is cost-effective. Under this type of program, vessel owners would be paid to either: 1) surrender their fishing permits and relinquish any claim associated with the fishing permit; or 2) surrender their fishing permits, withdraw their vessels from fishing, and relinquish any claims associated with the fishing permits and/or vessel. NMFS may consider this option after the rebuilding measures in this FMP, including limited access, are established.

The buyback program may be financed in a number of ways. One option is an industry-funded buyback in which NMFS borrows funds from the U.S. Treasury under Title XI of the Merchant Marine Act to purchase vessels. Vessel owners remaining in the fleet (who reap the benefit of a less crowded fishery) are obligated to repay this "loan" through a landing fee (maximum five percent) on the value of ex-vessel landings of the species for the fishery or fisheries in question.

Following discussions by the Billfish AP, it would also be possible for recreational resource users to design a buyback program funded (fully or partially) by recreational constituents. This program design would be submitted to the appropriate requesting official as a "business plan" and the FMP would be amended as necessary to accommodate this plan. NMFS is exploring options for making such a recreationally-funded program possible through framework provisions in the HMS FMP and Billfish FMP Amendment 1.

This option may minimize the economic impact for fishermen once limited access is implemented by actually paying some fishermen to surrender their permits and/or withdrawn their vessels from fishing. This option provides a positive incentive for marginal fishermen to leave the fishery. In addition, fishermen who remain in the fishery may have an increase in gross revenues due to fewer fishermen catching the fish. This option is consistent with limited access and the goals of this FMP. The impacts of this option, however, cannot be analyzed at this time as NMFS does not know how many, or which, fishermen would choose to participate in this program. Based on the comments received on the draft FMP and on the implementation of limited access, NMFS may consider this course of action in the future.

7.7.7 Issues Raised During the Comment Period

During the public comment period, NMFS received thousands of written comments, held 27 public hearings in most of the states along the Atlantic and Gulf of Mexico, and held an Advisory Panel meeting. Most of the comments received did not explicitly mention the IRFA or the significance of any of the alternatives. These comments and NMFS' responses can be found in the comment and responses section in Appendix 8. In addition, NMFS mentioned many of the comments received which were critical to changing the preferred alternatives in the sections above. The few comments which are explicitly related to the IRFA can also be found in Appendix 8.

7.7.8 Conclusion

The final actions in this FMP will have a significant economic impact on HMS fishermen. In addition, because these regulations will have a significant impact on commercial fishermen, this FMP will likely also impact related parties and communities (see Chapter 9) such as tournaments, charter/headboats, processors, and bait/gear suppliers. However, as a group, the final actions were specifically chosen both to minimize any economic impacts to the extent practicable and to meet the goals of this FMP and the Magnuson-Stevens Act; namely to prevent overfishing and rebuild overfished stocks. In the long term, the economic impacts endured now will be less than the economic impacts endured if HMS fisheries continue to decline and become commercially extinct.

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